Ecoregions of Nevada

Ecoregions denote areas of general similarity in ecosystems and in the type, quality, Vegas, Reno, and Carson City areas. Most of the state is internally drained and lies Literature Cited framework for the research, assessment, management, and monitoring of ecosystems and those in the northeast drain to the Snake River. There are 5 level III ecoregions and ecosystem components. By recognizing the spatial differences in the capacities and 43 level IV ecoregions in Nevada and many continue into ecologically similar and potentials of ecosystems, ecoregions stratify the environment by its probable parts of adjacent states (McGrath and others, 2002; Woods and others, 2001). response to disturbance (Bryce and others, 1999). Ecoregions are general purpose regions that are critical for structuring and implementing ecosystem management strategies across federal agencies, state agencies, and nongovernmental organizations that are responsible for different types of resources in the same geographical areas (Omernik and others, 2000).

The approach used to compile this map is based on the premise that ecological Oregon), Nevada Department of Conservation and Natural Resources–Division of regions can be identified through the analysis of the spatial patterns and the Environmental Protection, Nevada Department of Conservation and Natural composition of biotic and abiotic phenomena that affect or reflect differences in Resources-Nevada Natural Heritage Program, United States Department of ecosystem quality and integrity (Wiken, 1986; Omernik, 1987, 1995). These Agriculture-Forest Service (USFS), United States Department of phenomena include geology, physiography, vegetation, climate, soils, land use, Agriculture-Natural Resources Conservation Service (NRCS), United States wildlife, and hydrology. The relative importance of each phenomenon varies from one ecological region to another regardless of ecoregion hierarchical level. A Roman Department of the Interior—Fish and Wildlife Service, and United States Department Omernik, J.M., 1987, Ecoregions of the conterminous United States (map supplement): Annals of the numeral hierarchical scheme has been adopted for different levels of ecological of the Interior–Geological Survey (USGS)–Earth Resources Observation Systems regions. Level I is the coarsest level, dividing North America into 15 ecological (EROS) Data Center. regions. Level II divides the continent into 52 regions (Commission for Environmental Cooperation Working Group, 1997). At level III, the continental United States contains 104 ecoregions and the conterminous United States has 84 ecoregions (U.S. Environmental Protection Agency [USEPA], 2002). Level IV is a further subdivision of level III ecoregions. Explanations of the methods used to define the USEPA's ecoregions are given in Omernik (1995), Omernik and others

Nevada's physiography is composed of a repeating pattern of fault block mountains and intervening valleys. Valleys are shrub-covered or shrub- and grass-covered. Mountains may be brush-, woodland-, or forest-covered. Land use is primarily rangeland but many mines and large military reservations occur. Some valleys are irrigated and farmed, and rapid urban and suburban growth is occurring in the Las

(2000), Griffith and others (1994), and Gallant and others (1989).

5 Sierra Nevada

13a Salt Deserts

131 Lahontan Uplands

13m Upper Humboldt Plains

13g Wetlands

5a Mid-Elevation Sierra Nevada

5b High Elevation Sierra Nevada

13 Central Basin and Range

13c Sagebrush Basins and Slopes

13d Woodland- and Shrub-Covered Low

13e High Elevation Carbonate Mountains

13h Lahontan and Tonopah Playas

13i Lahontan Salt Shrub Basin 13k Lahontan Sagebrush Slopes

13n Mid-Elevation Ruby Mountains

13p Carbonate Sagebrush Valleys

13q Carbonate Woodland Zone

13r Central Nevada High Valleys

and Brushland

13u Tonopah Basin

13w Tonopah Uplands

14b Arid Footslopes

14f Mojave Playas

14g Amargosa Desert

13o High Elevation Ruby Mountains

13s Central Nevada Mid-Slope Woodland

13t Central Nevada Bald Mountains

13v Tonopah Sagebrush Foothills

13x Sierra Nevada-Influenced Ranges

Elevation Mountains

13aa Sierra Nevada-Influenced Semiarid

13y Sierra Nevada-Influenced High

13z Upper Lahontan Basin

Hills and Basins

14 Mojave Basin and Range

14a Creosote Bush-Dominated Basins

14c Mojave Mountain Woodland and

14d Mojave High Elevation Mountains 14e Arid Valleys and Canyonlands

22 Arizona/New Mexico Plateau

22d Middle Elevation Mountains

13b Shadscale-Dominated Saline Basins

The level III and IV ecoregion map on this poster was compiled at a scale of were originally compiled at a smaller scale (USEPA, 2002; Omernik, 1987). This poster is part of a collaborative project primarily between USEPA Region 9, USEPA National Health and Environmental Effects Research Laboratory (Corvallis, Department of the Interior-Bureau of Land Management (BLM), United States

The Nevada ecoregion project is associated with an interagency effort to develop a common framework of ecological regions. Reaching that objective requires recognition of the differences in the conceptual approaches and mapping methodologies applied to develop the most common ecoregion-type frameworks, including those developed by the USFS (Bailey and others, 1994), the USEPA (Omernik, 1987, 1995), and the NRCS (U.S. Department of Agriculture-Soil Conservation Service, 1981). As each of these frameworks is further refined, their differences are becoming less discernible. Regional collaborative projects, such as this one in Nevada, where agreement has been reached among multiple resource management agencies, are a step toward attaining consensus and consistency in

ecoregion frameworks for the entire nation.

and quantity of environmental resources. They are designed to serve as a spatial within the Great Basin; rivers in the southeast are part of the Colorado River system

Bailey, R.G., Avers, P.E., King, T., and McNab, W.H., eds., 1994, Ecoregions and subregions of the United States (map): Washington, D.C., USFS, scale 1:7,500,00 Bryce, S.A., Omernik, J.M., and Larsen, D.P., 1999, Ecoregions—a geographic framework to guide risk aracterization and ecosystem management: Environmental Practice, v. 1, no. 3, p. 141-155. Commission for Environmental Cooperation Working Group, 1997, Ecological regions of North America—toward a common perspective: Montreal, Commission for Environmental Cooperation, 71 p. 1:250,000 and depicts revisions and subdivisions of earlier level III ecoregions that Gallant, A.L., Whittier, T.R., Larsen, D.P., Omernik, J.M., and Hughes, R.M., 1989, Regionalization as

> a tool for managing environmental resources: Corvallis, Oregon, U.S. Environmental Protection Agency, EPA/600/3-89/060, 152 p. Griffith, G.E., Omernik, J.M., Wilton, T.F., and Pierson, S.M., 1994, Ecoregions and subregions of Iowa – a framework for water quality assessment and management: Journal of the Iowa Academy of

> J.A., Shelden, J., Crawford, R.C., Comstock, J.A., and Plocher, M.D., 2002, Ecoregions of Idaho:

Reston, Virginia, U.S. Geological Survey (map scale 1:1,350,000).

McMahon, G., Gregonis, S.M., Waltman, S.W., Omernik, J.M., Thorson, T.D., Freeouf, J.A., Rorick, A.H., and Keys, J.E., 2001, Developing a spatial framework of common ecological regions for the conterminous United States: Environmental Management, v. 28, no. 3, p. 293-316. Association of American Geographers, v. 77, p. 118-125, scale 1:7,500,000. Omernik, J.M., 1995, Ecoregions—a framework for environmental management in Davis, W.S. and Simon, T.P., editors, Biological assessment and criteria-tools for water resource planning and decision making: Boca Raton, Florida, Lewis Publishers, p. 49-62. Omernik, J.M., Chapman, S.S., Lillie, R.A., and Dumke, R.T., 2000, Ecoregions of Wisconsin: Transactions of the Wisconsin Academy of Sciences, Arts, and Letters, v. 88, p. 77-103. U.S. Department of Agriculture-Soil Conservation Service, 1981, Land resource regions and major land resource areas of the United States: Agriculture Handbook 296, 156 p.

(revision of Omernik, 1987): Corvallis, Oregon, USEPA-National Health and Environmental Effects Research Laboratory, Map M-1, various scales. Wiken, E., 1986, Terrestrial ecozones of Canada: Ottawa, Environment Canada, Ecological Land Classification Series no. 19, 26 p. Woods, A.J., Lammers, D.A., Bryce, S.A., Omernik, J.M., Denton, R.L., Domeier, M., and Comstock, J.A., 2001, Ecoregions of Utah: Reston, Virginia, U.S. Geological Survey (map scale 1:1,175,000).

U.S. Environmental Protection Agency, 2002, Level III ecoregions of the continental United States



Ecoregion 5 is a mountainous, deeply dissected, and westerly tilting fault block. It is largely composed of granitic rocks that are lithologically distinct from the sedimentary rocks of the Klamath Mountains (78) and the volcanic rocks of the Cascades (4). A high fault scarp divides the Sierra Nevada (5) from the Northern Basin and Range (80) and Central Basin and Range (13) to the east. Near this eastern fault scarp, the Sierra Nevada (5) reaches its highest elevations. Here, moraines, cirques, and small lakes are especially common and are products of Pleistocene alpine glaciation. Large areas are above timberline, including Mt. Whitney in California, the highest point in the conterminous United States at nearly 14,500 feet. The Sierra Nevada (5) casts a rain shadow

over Ecoregions 13 and 80 to the east. Higher elevation areas are mostly federally owned and include several national parks. In

5. Sierra Nevada

13. Central Basin and Range

recreational, military, and industrial uses.

Nevada, vegetation grades from Jeffrey pine to fir and whitebark pine at higher elevations. Alpine conditions exist at the highest Within Nevada, the **Mid-Elevation Sierra Nevada** ecoregion begins abruptly in the foothills of the Carson Range at the western edge of the state. Physiographically, the Carson Range is a Great Basin fault block mountain range, but its geology and forest type are more typical of the Sierra Nevada. The mid-elevation dry forest of Ecoregion 5a contains a diverse mix of conifers, including Jeffrey pine, sugar pine, incense cedar, and California white fir. The understory includes sagebrush, antelope bitterbrush, and a fire-maintained chaparral component of snowbrush and manzanita. The amount of pinyon-juniper

The **High Elevation Sierra Nevada** ecoregion includes subalpine forest and parkland between 7,500 and 9,500 feet elevation. The vegetation in this zone is adapted to extremes in heavy winter snowpack and summer drought. Sierra odgepole pine, red fir, western white pine, mountain hemlock, and whitebark pine comprise the moist forest at these elevations. Alpine tundra occurs on Mt. Rose, but it is too small an area to be mapped at this scale. The highest average annual precipitation amounts anywhere in Nevada occur in Ecoregion 5b. The east and west slopes of the Carson Range and the adjacent Lake Tahoe basin serve as important watersheds supplying water to urban and agricultural areas in western Nevada.

woodland in Ecoregion 5a is insignificant in contrast to other Nevada ecoregions in this elevation range.

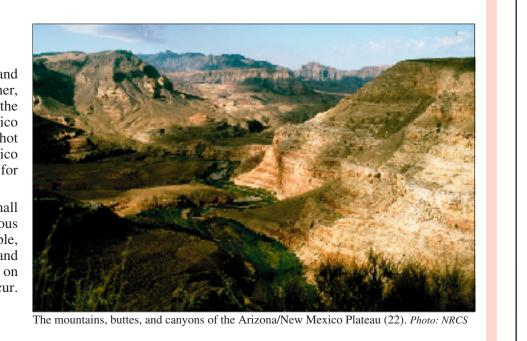
22. Arizona/New Mexico Plateau

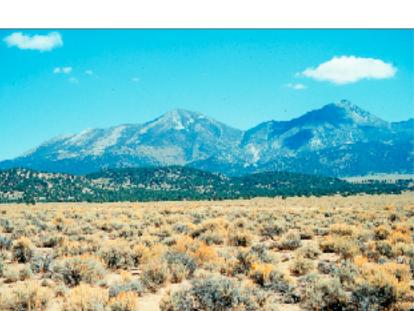
substrate is soluble and porous, allowing rapid infiltration.

Ecoregion 13 is composed of northerly trending fault-block ranges and intervening drier basins. Valleys, lower slopes, and alluvial fans are either shrub- and grass-covered, or shrub-covered. Higher elevation mountain slopes support woodland, mountain brush, and

Ecoregion 22 is a high dissected plateau underlain by horizontal beds of limestone, sandstone, and shale, cut by canyons, and punctuated by mountains, mesas, and buttes. The Arizona/New Mexico Plateau (22) is transitional between surrounding higher forested, mountainous ecoregions and lower, more arid shrublands. Ecoregion 22 is similar to the Colorado Plateaus (20) to the north in having abundant pinyon-juniper woodland and deep canyons (e.g. the Grand Canyon). However, the Arizona/New Mexico Plateau (22) is higher than the Colorado Plateaus (20), and it has less physiographic diversity. Ecoregion 22 lacks the broad, hot basins, such as Monument Valley and the Uinta Basin, that are found in the Colorado Plateaus (20). The Arizona/New Mexico Plateau (22) also contains more semiarid shrubland and subhumid grassland than Ecoregion 20, making it more suitable for

The Middle Elevation Mountains ecoregion, represented in southeastern Nevada by the Virgin Mountains, is a small portion of the Arizona/New Mexico Plateau (22). Its woodland zone differs from the woodlands of other mountainous areas in the Great Basin in the prevalence of interior chaparral species, such as Gambel oak, desert scrub oak, and canyon maple, interspersed with the pinyon and juniper. On the lower slopes, juniper mixes with Joshua tree and Mojave yucca; here, woodland starts at a lower elevation (about 4,000 feet) than in the Mojave Desert or Great Basin. Broad areas of mountain brush grow on upland slopes above the woodland. Isolated pockets of Rocky Mountain white fir and Rocky Mountain Douglas-fir also occur. They are outliers of a higher montane zone that is not extensive enough to map in Nevada.





pattern of fault block mountain ranges and intervening valleys. Precipitation increases and air temperature decreases with increasing elevation, and both influence the

west elevations of the intermontane basins, such as the Black Rock Desert in

coregion 13h, are too arid and alkaline to support vegetation. However, saline lakes

ollect the outflow of the Great Basin's internally drained streams and rivers. They

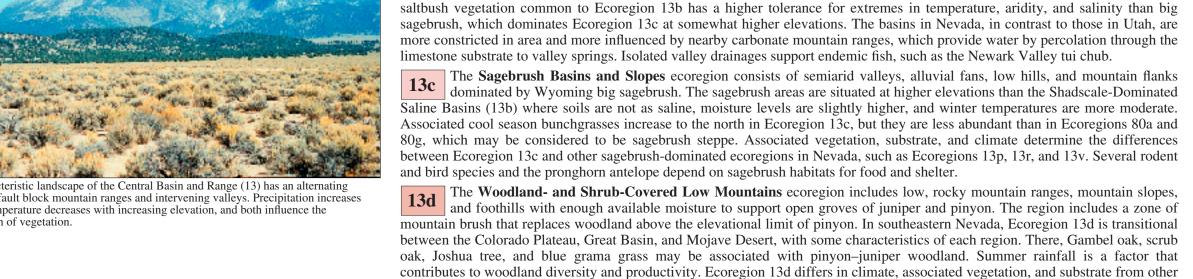
recipitation, substrate, soil type, aspect, and slope. The High Elevation Carbonate

and is characteristically underlain by limestone and dolomite.

Iountains (13e) are pictured here. Ecoregion 13e receives some summer precipitation,

and waterfowl. Photo: Jim Morefield, Nevada Natural Heritage Program

support brine shrimp that are the basis of a complex community of shorebirds, waders



woodland ecoregions in Nevada at similar elevations, such as Ecoregions 13q and 13s. The High Elevation Carbonate Mountains ecoregion includes a series of mountain ranges composed of limestone, dolomite, quartzite, and conglomerate in east central Nevada. These mountains are in the zone of summer rain, although much of the precipitation percolates through the porous rock to reemerge at lower elevations as springs. Still, these carbonatedominated mountains support a wider variety of conifers, such as white fir, Douglas-fir, and Engelmann spruce, and a greater diversity of understory species than other ranges in Nevada at similar elevations. Bristlecone pines have their widest distribution on carbonate substrates above 9,500 feet elevation. Conditions do not favor alpine tundra, however; alpine plants are more limited than on the nearby granitic High Elevation Ruby Mountains (130).

The Shadscale-Dominated Saline Basins ecoregion is arid, internally drained, and gently sloping to nearly flat. These basins are in, or characteristic of, the Bonneville Basin; they are higher in elevation and colder in winter than the Lahontan

Salt Shrub Basin (13j) to the west. Light-colored soils with high salt and alkali content occur and are dry for extended periods. The

The **Wetlands** ecoregion includes saline, brackish, or freshwater wetlands in flat to depressional terrain. Wetlands may dry up seasonally or be maintained by springs and groundwater infusions. Many wetlands have disappeared with farmland levelopment, river channelization, and stream incision; others have been created as a result of reclamation projects and irrigation seepage. Bulrushes, Baltic rush, cattails, burreed, and reed grass are common marsh plants. Many migratory birds, particularly vaterfowl and shorebirds, depend on the wetlands and marshes of the Great Basin. The nearly level and often barren **Lahontan and Tonopah Playas** contain mud flats, alkali flats, and intermittent saline lakes, such as the Black Rock Desert, Carson Sink, and Sarcobatus Flat. Marshes, remnant lakes, and playas are all that remain of Pleistocene Lake Lahontan, which was once the size of Lake Erie. Playas occur at the lowest elevations in the Lahontan Basin and represent the terminus or "sink" of rivers flowing east off the Sierra Nevada. They fill with seasonal runoff from surrounding mountain ranges during winter, providing habitat for migratory birds. Black greasewood or four-winged saltbush may

The Lahontan and Tonopah Playas are important as wildlife habitat and for some recreational and military uses. The Lahontan Salt Shrub Basin is an expansive dry plain that was once beneath Pleistocene Lake Lahontan. The Lahontan Basin, compared to the Bonneville Basin to the east in Ecoregion 13b, is lower in elevation and warmer in winter. Although there is a direct connection to the south through low elevation valleys to the Mojave Basin and Range (14), winters are cold enough in Ecoregion 13j to discourage the northward dispersal of many Mojavean species into the Lahontan Basin. In addition to shadscale, other salt-tolerant shrubs, such as Shockley desert thorn and Bailey greasewood, cover the lower basin slopes, and distinguish the Lahontan Salt Shrub Basin (13j) and Tonopah Basin (13u) from other Nevada salt shrub ecoregions. Sand dunes may occur where windblown sand accumulates against a barrier; dune complexes support a specialized plant community and diverse small mammal populations. The Carson and Truckee rivers, originating in the Sierra Nevada, provide water for irrigated farming. Riparian corridors along these rivers support the only trees found in the ecoregion.

grow around the perimeter in the transition to the salt shrub community, where they often stabilize areas of low sand dunes.

coregion 13h has very limited grazing potential. Windblown salt dust from exposed playas may affect upland soils and vegetation.

Hills, alluvial fans, and low mountains within the Lahontan Basin comprise the Lahontan Sagebrush Slopes ecoregion. These areas are rock controlled and their soils lack the fine lacustrine sediments that are found in the lower parts of the Lahontan Basin. Because moisture increases and alkalinity decreases with elevation, the shrub community grades from the greasewood–shadscale community on the basin floor to a shrub community dominated by Wyoming big sagebrush and the endemic Lahontan sagebrush at higher elevations. Understory grasses increase in productivity toward the northeast, outside the rain shadow influence of the Sierra Nevada. The low hills and mountains within the Lahontan Basin experience frequent summer lightning and fire. Introduced cheatgrass tends to replace the shrub community and provides fuel for recurrent fires. The Lahontan Uplands ecoregion is restricted to the highest elevations of the mountain ranges within the Lahontan Salt

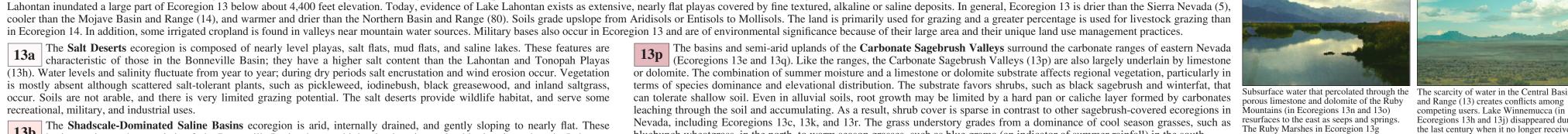
Shrub Basin (13j). Slopes vary in elevation from 6,400 to 8,800 feet and are covered by sagebrush, grasses, and scattered Utah juniper. Pinyon grows with juniper on the Stillwater Range and on Fairview Peak in the southeast portion of the Lahontan Basin, but it is otherwise absent from Ecoregion 13l. Low sagebrush and black sagebrush grow to the mountaintops above the woodland zone. Cool season grasses, including bluebunch wheatgrass, dominate the understory in the north, but are replaced by varm season grasses, such as Indian ricegrass, in the south. The Upper Humboldt Plains ecoregion is an area of rolling plains punctuated by occasional buttes and low mountains. It is mostly underlain by volcanic ash, rhyolite, and tuffaceous rocks. Low sagebrush is common in extensive areas of hallow, stony soil, as are cool season grasses, such as bluebunch wheatgrass, Idaho fescue, and Sandberg bluegrass. The Upper

Humboldt Plains ecoregion (13m) is wetter and cooler than other Nevada ecoregions in its elevation range. Ecoregion 13m is

that receives more summer rain and less winter precipitation. At higher elevations within Ecoregion 13n, curlleaf mountain-

transitional to the Northern Basin and Range (80) that spans the Nevada–Oregon border. However, as in the warmer Lahontan Basin to the west, lightning fires are common and a post-fire monoculture of cheatgrass tends to replace the native grasses and shrubs. Grazing is the major land use, though there is some agriculture near the Humboldt River. The Mid-Elevation Ruby Mountains ecoregion covers the lower slopes of the Ruby Mountains in northeastern Nevada. Although its elevation range, 6,500 to 8,500 feet, is typical of the pinyon–juniper woodland zone, sagebrush and mesic mountain shrub species are dominant here. Pinyon and juniper are uncommon on the western slopes of the Ruby Mountains, possibly because these foothills are in the direct path of winter weather from the west and cold arctic air masses from the north. This phenomenon is in contrast to the wide elevational distribution of pinyon–juniper in the Carbonate Woodland Zone (13q)

mahogany and aspen groves form the transition to the High Elevation Ruby Mountains (130). The High Elevation Ruby Mountains ecoregion represents those portions of the Ruby Mountains that are dominated by granitic and metamorphic rock types, and that were heavily glaciated during the Pleistocene. Extensive periglacial phenomena, such as solifluction fields, are still active at higher elevations. Since the end of Pleistocene glaciation, closed canopy conifer forests have not recolonized the Ruby Mountains, even though the Ruby Mountains receive more precipitation than the High Elevation Carbonate Mountains (13e) to the east. The High Elevation Ruby Mountains ecoregion (13o) is the wettest ecoregion in Nevada outside of the High Elevation Sierra Nevada (5b). Some of the most extensive aspen groves in Nevada occur here. Subalpine meadows and scattered white fir, limber pine, and whitebark pine mingle upwards to the jagged, exposed peaks at elevations over 11,000 feet. Snowmelt moisture trapped by the impervious substrate supports extensive alpine meadows and alpine



bluebunch wheatgrass, in the north, to warm season grasses, such as blue grama (an indicator of summer rainfall) in the south. In the Carbonate Woodland Zone the pinyon–juniper woodland canopy overtops and spans the existing sagebrush and mountain brush communities. The pinyon-juniper woodland has a broader elevational range in the carbonate areas of eastern Nevada than elsewhere in Ecoregion 13, even extending onto the floors of the higher basins, partially because of greater summer precipitation. Both pinyon and juniper decline north of Ecoregion 13q; in Ecoregion 80, juniper grows alone and without distinct elevational banding. Historically, miners cut pinyon and juniper for mine timbers. Since the beginning of fire suppression early in the last century, juniper-pinyon woodland has increased in density and expanded into lower sagebrush zones. More recently, large areas of pinyon-juniper woodland have been cleared to increase forage for cattle. The woodland understory is diverse due to the influence of carbonate substrates and summer rainfall. There are more springs and live streams in Ecoregion 13c than in western non-carbonate woodlands (e.g. Central Nevada Mid-Slope Woodland and Brushland (13s)) because the carbonate

The Central Nevada High Valleys ecoregion contains sagebrush-covered rolling valleys that are generally over 5,000 feet in elevation. Alluvial fans spilling from surrounding mountain ranges fill the valleys, often leaving little intervening at ground. Wyoming big sagebrush and associated grasses are common on the flatter areas, and black sagebrush dominates on the The Lahontan cutthroat trout occurs in the volcanic hills and alluvial fans. Ecoregion 13r tends to have a lower species diversity than many other sagebrush-dominated Truckee River-Pyramid Lake system of ecoregions (including Ecoregions 13c, 13m, 13p, 13aa, 80a, and 80g) because of its aridity and its isolation from more species-rich areas. Saline playas may occur on available flats. Less shadscale and fewer associated shrubs surround these playas than in other 13x and 13aa. Their numbers are declinin lower, more arid ecoregions to the west, including the Lahontan Salt Shrub Basin (13j) and Tonopah Basin (13u). Valleys with due to loss of habitat, diversion of perennia permanent water support endemic fish species, such as the Monitor Valley speckled dace.

The Central Nevada Mid-Slope Woodland and Brushland ecoregion at 6,500 to 8,000 feet elevation is analogous in Nevada-Reno, Biological Resources Research altitudinal range to other woodland areas in Nevada. However, continuous woodland is not as prevalent on the mountains of central Nevada as in other woodland ecoregions, such as Ecoregions 13d and 13q. Pinyon–juniper grows only sparsely through the shrub layer due to the combined effects of past fire, logging, and local climate factors, including lack of summer rain and the pattern of winter cold air inversions. Where extensive woodlands do exist, understory diversity tends to be very low, especially in closed canopy areas. Areas of black and Wyoming big sagebrush grade upward into mountain big sagebrush and curlleaf mountain-mahogany, which straddles the transition between this mid-elevation brushland and the mountain brush zone of the higher Central Nevada Bald Mountains (13t). The Central Nevada Bald Mountains are dry and mostly treeless. Although they rise only a hundred miles east of the Sierra Nevada, they lack Sierra Nevada species because of the dry conditions. These barren-looking mountains are

covered instead by dense mountain brush that is dominated by mountain big sagebrush, western serviceberry, snowberry, and low sagebrush. They contrast with the forested High Elevation Carbonate Mountains (13e) to the east, where the mountain brush zone is too narrow to be mapped as a separate ecoregion. Scattered groves of curlleaf mountain-mahogany and aspen in moister Wildhorses are protected in Nevada and microsites grow above the shrub layer. A few scattered limber or bristlecone pines grow on ranges that exceed 10,000 feet. The Toiyabe Range (west of Big Smoky Valley) is high enough to have an alpine zone, but it lacks a suitable substrate to retain livestock and wildlife for limited forage, vegetative cover is easily over-grazed as nowmelt moisture. The isolation of these "sky islands" has led to the development of many rare and endemic plant species. The **Tonopah Basin** lies in the transition between the Great Basin and the more southerly Mojave Desert. The Tonopah Photo: State of Nevada, Commission for the Natural Heritage Program Basin shows varying degrees of Great Basin and Mojave Desert characteristics. The west side of the Tonopah Basin is a *Preservation of Wild Horses* ontinuation of the Lahontan Basin while the lower and hotter Pahranagat Valley on the east side is more like the Mojave Desert.

Similar to basins farther north, shadscale and associated arid land shrubs cover broad rolling valleys, hills, and alluvial fans. However, unlike the Lahontan Salt Shrub Basin (13j) and Upper Lahontan Basin (13z), the shrubs often co-dominate in highly diverse mosaics. The shrub understory includes warm season grasses, such as Indian rice grass and galleta grass. Valleys with erennial water contain endemic fish species, including the Railroad Valley tui chub, Pahranagat roundtail chub, Railroad Valley pringfish, and White River springfish. The Tonopah Sagebrush Foothills ecoregion includes the low mountains and hills rising from the floor of the flatter

Tonopah Basin (13u). The substrate is rocky and lacks the fine sediments found at lower elevations in Ecoregion 13u. Great Basin species are common in this ecoregion as they are further north in the Lahontan Sagebrush Slopes (13k). However, because Ecoregion 13v is in the rain shadow of the Sierra Nevada and is adjacent to the Mojave Desert, it is more arid than Ecoregion 13k. As a result, black sagebrush is more prevalent in the shrub overstory of Ecoregion 13v, and the more mesic understory species that are found farther north and east are largely absent. Mojave desert species, such as blackbrush, Joshua tree, and cholla cactus, become more common in the east and south, where summer moisture is more prevalent. Streams are ephemeral and flow during and immediately after storms. Storm events can be of sufficient magnitude to move large quantities of sediment in treambeds. Because of the droughty conditions, Ecoregion 13v has a low carrying capacity for cattle.

The **Tonopah Uplands** ecoregion includes woodland- or shrub-covered hills and mountains ranging from 6,000 to 9,500

Basin and northern Mojave Desert. They feet in elevation. As elsewhere in the Tonopah region, Great Basin and Mojave Desert elements blend together especially where individuals have been found to toward the south and east, where some mountain brush and interior chaparral components, including Gambel oak, become more exceed 4,000 years of age. Photo: Jim common. Pinyon–juniper woodland is extensive between 6,000 and 8,000 feet elevation. The highest peaks support a few white fir, Morefield, Nevada Natural Heritage Program limber pine, or bristlecone pine.

The Sierra Nevada-Influenced Ranges are those wooded Great Basin mountains that have climatic and biotic affinities to the Sierra Nevada. Overall, Ecoregion 13x receives greater precipitation than the mountain ranges of Central Nevada Ecoregions 13s and 13t). However, in Ecoregion 13x, precipitation amounts vary from range to range in relation to the local strength of the Sierra Nevada rain shadow. Because of minimal summer rainfall, Ecoregion 13x contains pinyon-juniper woodland, but lacks oak and Ceanothus species. The White, Sweetwater, Pine Nut, Wassuk, and Virginia ranges support varying mounts of Sierra Nevada flora, including small stands of ponderosa, lodgepole, Jeffrey, and western white pine. Scattered ephemeral pools perched over areas of flat, impermeable volcanic bedrock are similar to those in the High Lava Plains (80g) and upport unique assemblages of flora and fauna. High ranges near the Sierra Nevada are more likely to have perennial streams. ighorn sheep, deer, and black bear inhabit these mountains.

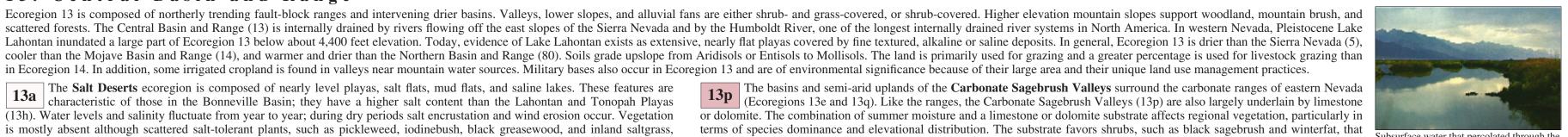
The Sierra Nevada-Influenced High Elevation Mountains occupy the elevational zone above the woodland-covered Halogeton is an in Sierra Nevada-Influenced Ranges (13x), and are affected in varying degrees by Sierra Nevada climate. Elevations range in arid basins and along roadsides. It is toxic expanding the distribution of limber and in a livesteel. from 9,000 to nearly 14,000 feet. Ecoregion 13y is generally covered by shrubs (e.g. mountain big sagebrush, low sagebrush, and mountain-mahogany), small aspen groves (on moist sites), scattered stands of high elevation conifers, and Sierra Nevada subalpine and alpine forbs. Moisture amounts captured by the highest ranges in Ecoregion 13y result in substantial perennial stream flow in

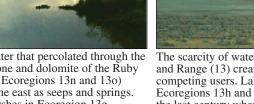
The **Upper Lahontan Basin** lies outside of the rain shadow cast by the Sierra Nevada and records somewhat higher rainfall and cooler temperatures than other portions of the Lahontan Basin. Although its shadscale–greasewood plant nmunity is similar to that in the Lahontan Salt Shrub Basin (13j), some species differ due to climate gradations. For example, Bailey greasewood is less common and Thurber needlegrass is more common in the Upper Lahontan Basin (13z) than in the Lahontan Salt Shrub Basin (13j). Ecoregion 13z also has a shorter growing season than the rest of the Lahontan Basin. The Sierra Nevada-Influenced Semiarid Hills and Basins ecoregion includes the basins and lower mountain slopes immediately east of the Sierra Nevada that are affected by its climate or that have its characteristic granitic substrate. Ecoregion 13aa differs from the Lahontan Sagebrush Slopes (13k) in that plants with slightly higher moisture requirements, such as antelope bitterbrush and desert peach, may be associated with the semiarid shrub community, especially near the Sierra Nevada. The White Mountains, and other parts of the Sierra Nevada. Influenced Panger (13v)

The White Mountains, and other parts of the Sierra Nevada. Influenced Panger (13v)

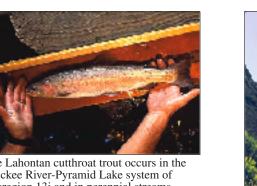
Desert peach has somewhat higher more parts of the Sierra Nevada. Influenced Panger (13v) front. Three large river systems, the Truckee, Carson, and Walker, flow eastward through this region from the Sierra Nevada, receive enough rainfall to support various semiarid shrub community. It grows in providing water for agriculture and urban development. Their floodplains support some of the best remaining riparian cottonwood Sierra Nevada plant and animal species. forest in the state, which has been degraded in many areas by grazing, agriculture, and invasive weeds. The Truckee and Walker

Photo: Jim Morefield, Nevada Natural Heritage rivers and their tributaries also provide habitat for the threatened Lahontan cutthroat trout.



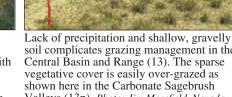


competing users. Lake Winnemucca (in Ecoregions 13h and 13j) disappeared durin the last century when it no longer received provide crucial nesting and feeding grounds water from Pyramid Lake due to increased for wildlife. Photo: State of Nevada, Division of withdrawals for irrigation and urbanization. Photo: Jim Morefield, Nevada Natural Heritage



streams, and competition with introduced game fish. Photo: Gary Vinyard, University of

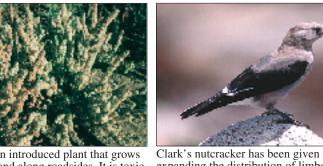




managed. Though wild horses compete with Central Basin and Range (13). The sparse onsider them part of our national heritage. Valleys (13p). *Photo: Jim Morefield, Nevada*







whitebark pine into the Great Basin through its collection and caching of pine nuts.



western Nevada in the Sierra Nevada-Influenced Semiarid Hills and Basins (13aa Photo: Jim Morefield, Nevada Natural Heritage

14. Mojave Basin and Range

lakes are common. Wildlife includes mule deer, bighorn sheep, and mountain goats.

Ecoregion 14 is composed of broad basins and scattered mountains that are generally lower, warmer, and drier than those of the Central Basin and Range (13). Its creosote bush-dominated shrub community is distinct from the saltbush–greasewood and sagebrush–grass associations that occur to the north in the Central Basin and Range (81) and Northern Basin and Range (81) to the south. The basin soils are mostly Entisols and Aridisols that typically have a thermic temperature regime; they are warmer than those of Ecoregion 13. Heavy use of off-road vehicles and motorcycles in some areas has made the soils susceptible to wind and water erosion. Most of Ecoregion 14 is federally owned and there is relatively little grazing activity because of the lack of water and forage for livestock.

Mojave Desert at elevations ranging from 1,800 to 4,500 feet. Elevations are lower, soils are warmer, and evapotranspiration is higher than in the Central Basin and Range (13) to the north. Limestone- and gypsum-influenced soils occur, but overall, precipitation amount has a greater ecological significance than geology. Toward the south and east, as summer rainfall increases, the Sonoran influence grows, and woody leguminous species, such as mesquite and acacia, become more common. Creosote bush, white bursage, and galleta grass characterize the plant community of Ecoregion 14a. Pocket mice, kangaroo rats, and desert tortoise are faunal indicators of the desert environment. Desert willow, coyote willow, and mesquite grow in riparian areas, although the alien invasive tamarisk is rapidly replacing native desert riparian vegetation. The Arid Footslopes ecoregion is composed of alluvial fans, basalt flows, hills, and low mountains that rise above the basin floors of the Mojave Desert to an average elevation of 6,200 feet. The sparsely vegetated soils are very erodible

during storm events. In areas transitional to the Great Basin in the north, blackbrush dominates slopes just above the upper elevational limit for creosote bush. Elsewhere, a mixture of more typical Mojave Desert forbs, shrubs, and succulent species occurs, including Joshua tree, other yucca species, and cacti on rocky sites. Ecoregion 14b has a diverse array of reptiles, including iguanas, chuckwallas, and leopard, collared, horned, and spiny lizards. Desert bighorn sheep may also be present on remote rocky outcrops in Ecoregion 14b, particularly in the Desert National Wildlife Range, which was established to preserve bighorn habitat. The Mojave Mountain Woodland and Shrubland ecoregion occurs between 6,000 and 8,000 feet elevation where mean annual precipitation levels increase to between 10 and 16 inches per year. Vegetation includes pinyon, Utah juniper, Rocky Iountain juniper, curlleaf mountain-mahogany, and cliffrose. In many areas, a denser and more diverse mixture of large interior chaparral shrubs occurs, including oaks, ceanothus, silktassel, and Apache plume. A sagebrush zone is largely absent, but some Wyoming big sagebrush may be found in the understory of the woodland along with blackbrush. The riparian zones along the few perennial streams in the Spring Mountains have willow, mountain brush, black cottonwood, and Gambel oak, and provide rare

The Mojave High Elevation Mountains ecoregion is mostly underlain by limestone and other sedimentary rocks. The high mountains of Ecoregion 14d support mountain brush, ponderosa pine, and white fir that merge, at highest elevations,

The Creosote Bush-Dominated Basins ecoregion includes the valleys lying between the scattered mountain ranges of the with groves of limber pine and bristlecone pine. The isolation and relatively mesic climate of these "sky islands" have led to the development of numerous rare and endemic species, many of which extend downward in elevation into the Mojave Mountain Woodland and Shrubland (14c). Recreational use is especially heavy in the Spring Mountains between Las Vegas and Pahrump. Arid Valleys and Canyonlands ecoregion includes steep canyons and benchlands below 2,000 feet elevation near the Colorado River. This is one of the hottest and driest ecoregions in Nevada, receiving only 2 to 7 inches of rainfall per year. Rocky colluvial soils cover eroded slopes and deeper soils occur on benches. Vegetation is a sparse, but diverse, shrub cover Basins (14a) compete for limited water and bunting, and disease carried by domestic that includes creosote bush, white brittlebush, white bursage, and occasional Sonoran desert elements, such as ocotillo. Along the may suppress the growth of other plants livestock. There has been some success in rivers, the introduced tamarisk is replacing native riparian vegetation, such as Fremont cottonwood and willow. The presence of through the secretion of toxins.

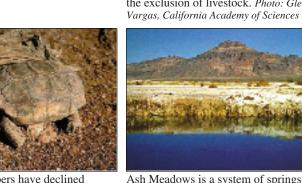
> The Mojave Playas are generally smaller in area than the Lahontan and Tonopah Playas (13h) and are not part of the broad Pleistocene pluvial basins that are found in the Central Basin and Range (13) to the north. Ecoregions 14f and 13h are both largely barren and only sparse saltbush vegetation is typically found on their margins. Greasewood, which is common near Lahontan and Tonopah Playas (13h), is absent from the margins of the Mojave Playas (14f). Where moisture is sufficient, cold-intolerant trees and woody legumes such as velvet ash and mesquite occur on the Mojave Playas (14f), particularly toward the

the Colorado River and Lake Mead greatly influences the management and ecology of this ecoregion.

The **Amargosa Desert** ecoregion is an arid, internally-drained basin. It has greater temperature extremes and less Sonoran influence than the Creosote Bush-Dominated Basins (14a). This is due in part to the Spring Mountains that border coregion 14g on the east and block summer rainfall. In the Amargosa Desert (14g), rainfall occurs mostly between October and April. Creosote bush and bursage predominate as they do in Ecoregion 14a, but the diversity of associated shrub species is lower. Irrigated farms in the Amargosa Valley produce alfalfa, sorghum, dairy products, and pistachio nuts. As in the Pahranagat Valley Desert tortoise numbers have declined to the northeast in Ecoregion 13u, the Amargosa Valley is a discharge point for an underground water system. Where the tortoise is easy previously in the last 20 years. The desert and ponds in the Amargosa Desert (14g. Amargosa River surfaces, it creates wetland oases that can be extensive, including Oasis Valley near Beatty. A larger, but isolated, vehicles, and urban development. Ravens necessary for the survival of the endangered system of seeps and springs at Ash Meadows National Wildlife Refuge provides habitats for a large number of endemic plants and are also a major predator of young tortoises. Ash Meadows Amargosa pupfish and other



wilderness areas through reintroductions and the exclusion of livestock. Photo: Glenn



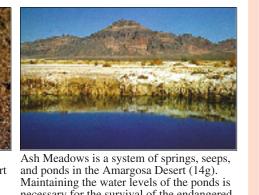
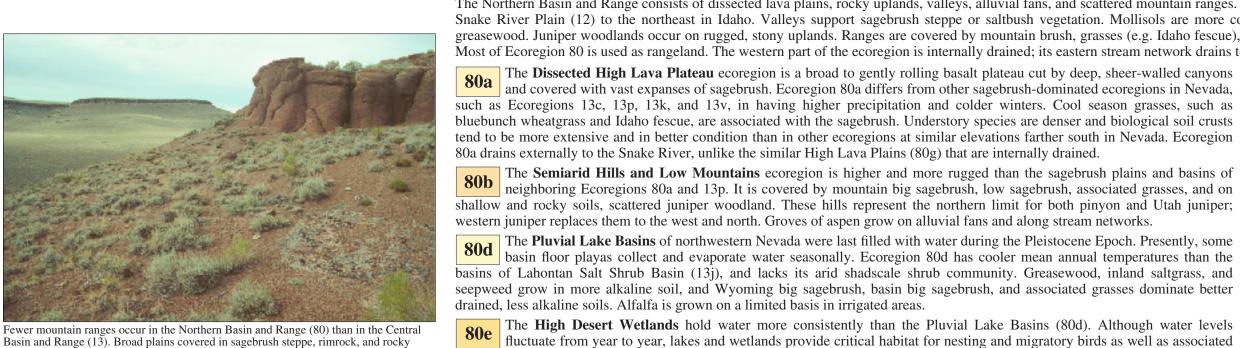


Photo: Glenn Clemmer, Nevada Natural Heritage inhabitants of its springs and pools. Photo:



uplands are typical of Ecoregion 80. Photo: Jim Morefield, Nevada Natural Heritage Program

Basin and Range (13) to the north. However, Ecoregion 14 is warmer and drier and has

milder winters and a different vegetation mosaic than Ecoregion 13. Mojavean flora,

including creosote bush, Joshua trees and other vucca species, are pictured here in the

80. Northern Basin and Range

habitat for bird life in the desert.

The Northern Basin and Range consists of dissected lava plains, rocky uplands, valleys, alluvial fans, and scattered mountain ranges. Overall, it is cooler and has more available moisture than the Central Basin and Range (13). Ecoregion 80 is higher and cooler than the Snake River Plain (12) to the northeast in Idaho. Valleys support sagebrush steppe or saltbush vegetation. Mollisols are more common than in the hotter and drier basins of the Central Basin and Range (13) where Aridisols support sagebrush, shadscale, and greasewood. Juniper woodlands occur on rugged, stony uplands. Ranges are covered by mountain brush, grasses (e.g. Idaho fescue), aspen groves, or forest dominated by subalpine fir. Elevational banding of mountain vegetation is not as apparent as in Ecoregion 13. Most of Ecoregion 80 is used as rangeland. The western part of the ecoregion is internally drained; its eastern stream network drains to the Snake River system. and covered with vast expanses of sagebrush. Ecoregion 80a differs from other sagebrush-dominated ecoregions in Nevada, such as Ecoregions 13c, 13p, 13k, and 13v, in having higher precipitation and colder winters. Cool season grasses, such as bluebunch wheatgrass and Idaho fescue, are associated with the sagebrush. Understory species are denser and biological soil crusts

80a drains externally to the Snake River, unlike the similar High Lava Plains (80g) that are internally drained. The Semiarid Hills and Low Mountains ecoregion is higher and more rugged than the sagebrush plains and basins of neighboring Ecoregions 80a and 13p. It is covered by mountain big sagebrush, low sagebrush, associated grasses, and on shallow and rocky soils, scattered juniper woodland. These hills represent the northern limit for both pinyon and Utah juniper; western juniper replaces them to the west and north. Groves of aspen grow on alluvial fans and along stream networks. The Pluvial Lake Basins of northwestern Nevada were last filled with water during the Pleistocene Epoch. Presently, some basin floor playas collect and evaporate water seasonally. Ecoregion 80d has cooler mean annual temperatures than the basins of Lahontan Salt Shrub Basin (13j), and lacks its arid shadscale shrub community. Greasewood, inland saltgrass, and seepweed grow in more alkaline soil, and Wyoming big sagebrush, basin big sagebrush, and associated grasses dominate better drained, less alkaline soils. Alfalfa is grown on a limited basis in irrigated areas.

fluctuate from year to year, lakes and wetlands provide critical habitat for nesting and migratory birds as well as associated upland birds and mammals. Sedges, rushes, tufted hairgrass, meadow barley, and creeping wildrye grow in wetter areas. The **High Lava Plains** of Nevada are part of a vast sagebrush steppe that extends northward to the Blue Mountains of Oregon. Ecoregion 80g is similar to the Dissected High Lava Plateau (80a) in its physiography, climate, and vegetation, but, unlike Ecoregion 80a, it is internally drained. As a result, the fish assemblage of Ecoregion 80g lacks an

The High Desert Wetlands hold water more consistently than the Pluvial Lake Basins (80d). Although water levels

The **Dissected High Lava Plateau** ecoregion is a broad to gently rolling basalt plateau cut by deep, sheer-walled canyons anadromous component. Bluebunch wheatgrass is generally associated with Wyoming big sagebrush, except where bunchgrasses have been depleted by grazing and replaced by cheatgrass. Scattered ephemeral pools on impermeable volcanic bedrock are characteristic of Ecoregion 80g in Nevada; they harbor unique flora and fauna as do those in the Sierra Nevada-Influenced Ranges

(13x) of the Central Basin and Range (13). The **Semiarid Uplands** ecoregion covers disjunct areas across northern Nevada. It includes hills, low mountains, volcanic Mountains in Ecoregions 80j and 80k. Here cyanobacteria, mosses, and lichens. They cones, and buttes that rise out of the drier Dissected High Lava Plateau (80a) and High Lava Plains (80g). Elevational the juniper woodland zone is replaced by cover the dry desert floor and protect it from banding is much less apparent on the mountains of Ecoregion 80j than in Ecoregion 13q to the south. Mountain big sagebrush and mountain brush and scattered groves of grasses, such as Idaho fescue, are common. The density and extent of juniper woodland varies with long-term climate fluctuations, aspen. grazing pressure, and fire frequency. Juniper woodland is absent in the Jarbidge and Santa Rosa mountains, where mountain brush and scattered aspen groves occupy the woodland zone.

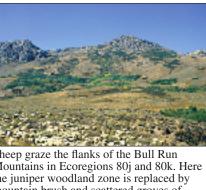
In northern Nevada, the Partly Forested Mountains ecoregion covers the high elevation portions of the Jarbidge and Independence mountains. These mountain ranges support limber pine, subalpine fir, low juniper, whitebark pine, mountain brush, and, at highest elevations on poorly drained soils, small areas of tundra and alpine meadows. Alpine tundra development is more limited in the Jarbidge Mountains than in the High Elevation Ruby Mountains (130) because the metamorphic substrate of the Jarbidge Mountains is not conducive to soil building or water retention. Streams draining the Jarbidge and Independence mountains provide habitat for eastern populations of the threatened Lahontan cutthroat trout. The Salt Shrub Valleys ecoregion is composed of arid basins once inundated by Pleistocene lakes. Climate, soil, and vegetation are similar and transitional to the Lahontan Salt Shrub Basin (13j). Nearly flat basin floors and barren playas

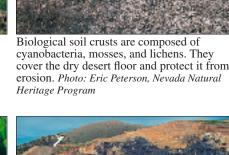
This Humboldt beaver in the Jarbidge are poorly drained, have a high water table, and retain water seasonally. Strongly alkaline soils are characteristic. Vegetation is Mountains of northern Nevada is a relic of a Independence Range (80j). Photo: Jim dominated by black greasewood, spiny hopsage, bud sagebrush, Wyoming big sagebrush, inland saltgrass, alkali sacaton, and time when beaver were more widespread.

Photo: David A. Charlet, 1993, Community

Morefield, Nevada Natural Heritage Program

**Morefield, N





College of Southern Nevada

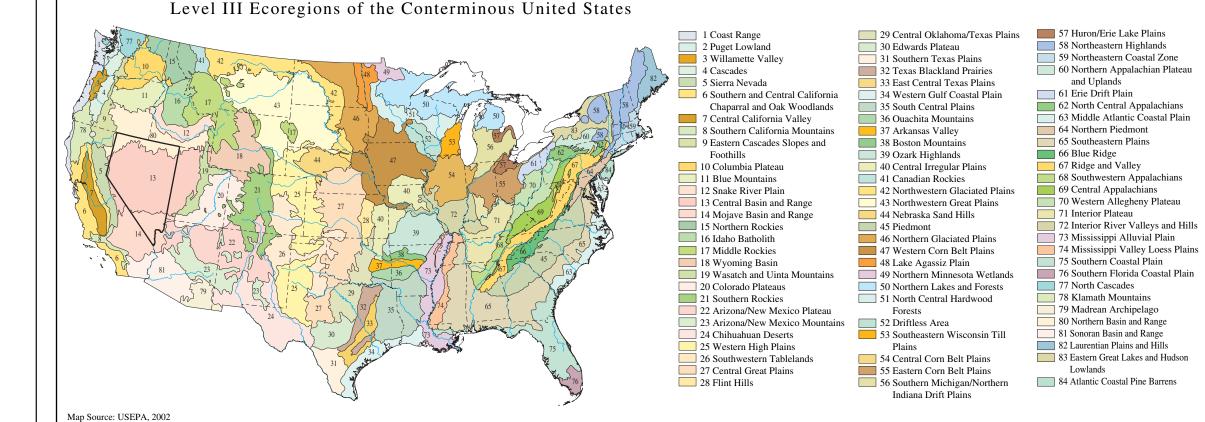












Level III ecoregion ———

Level IV ecoregion ————

County boundary — - - - -

State boundary ————

80 Northern Basin and Range

80a Dissected High Lava Plateau

80d Pluvial Lake Basins

80e High Desert Wetlands

80g High Lava Plains

80k Partly Forested Mountains

Albers equal area projection

Standard parallels 37° N and 41° N

80j Semiarid Uplands

80l Salt Shrub Valleys

80b Semiarid Hills and Low Mountains

PRINCIPAL AUTHORS: Sandra A. Bryce (Dynamac Corporation) Alan J. Woods (Dynamac Corporation), James D. Morefield (Nevada Natural Heritage Program), James M. Omernik (USEPA), Thomas R. McKay (NRCS), Gary K. Brackley (NRCS), Robert K. Hall (USEPA) Damian K. Higgins (U.S. Fish and Wildlife Service), David C. McMorran (USFS), Karen E. Vargas (Nevada Division of Environmental Protection), Eric B. Petersen (Nevada Natural Heritage Program), Desiderio C. Zamudio (USFS), and Jeffrey A. Comstock

(Indus Corporation). COLLABORATORS AND CONTRIBUTORS: Bill Brooks (BLM), Robin Tausch (USFS-Rocky Mountain Research Station), and Bill W. Daily (NRCS).

REVIEWERS: Edgar F. Kleiner (Emeritus Professor, University of Nevada-Reno), Frederick F. Peterson (Emeritus Professor, University of Nevada-Reno), Harold Klieforth (Emeritus, Associate Research Meteorologist, Desert Research Institute), David Charlet (Professor, Community College of Southern Nevada), David A. Mouat (Associate Research Professor, Earth and Ecosystems Sciences, Desert Research nstitute), Glenn Gentry (Supervisor, Water Quality Monitoring, Nevada Division of Environmental Protection), and Mark Warren (Staff Biologist, Nevada Division of Wildlife).

CITING THIS POSTER: Bryce, S.A., Woods, A.J., Morefield, J.D., Omernik, J.M., McKay, T.R., Brackley, G.K., Hall, R.K., Higgins, D.K., McMorran, D.C., Vargas, K.E., Petersen, E.B., Zamudio, D.C., and Comstock, J.A., 2003, Ecoregions of Nevada (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,350,000). This project was partially supported by funds from the USEPA- Office of Research and Development's Environmental Monitoring and Assessment Program through contract 68-C6-005 to Dynamac Corporation.